

# SEQUENCE LISTING

<110> Matti Sallberg  
Catharina Hultgren

<120> VACCINES CONTAINING RIBAVIRIN AND  
METHODS OF USE THEREOF

<130> TRIPEP.23AUS2

<150> 09/705,547

<151> 2000-11-03

<150> 60/229,175

<151> 2000-08-29

<150> 60/225,767

<151> 2000-08-17

<160> 49

<170> FastSEQ for Windows Version 4.0

<210> 1

<211> 3011

<212> PRT

<213> Artificial Sequence

<220>

<223> Hepatitis C virus sequence

<400> 1

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Arg Arg Pro Gln Asp Val Lys Phe Pro Gly Gly Gly Gln Ile Val Gly
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Gly Val Tyr Leu Leu Pro Arg Arg Gly Pro Arg Leu Gly Val Arg Ala
      35             40             45
Thr Arg Lys Thr Ser Glu Arg Ser Gln Pro Arg Gly Arg Arg Gln Pro
      50             55             60
Ile Pro Lys Ala Arg Arg Pro Glu Gly Arg Thr Trp Ala Gln Pro Gly
      65             70             75             80
Tyr Pro Trp Pro Leu Tyr Gly Asn Glu Gly Cys Gly Trp Ala Gly Trp
      85             90             95
Leu Leu Ser Pro Arg Gly Ser Arg Pro Ser Trp Gly Pro Thr Asp Pro
      100            105            110
Arg Arg Arg Ser Arg Asn Leu Gly Lys Val Ile Asp Thr Leu Thr Cys
      115            120            125
Gly Phe Ala Asp Leu Met Gly Tyr Ile Pro Leu Val Gly Ala Pro Leu
      130            135            140
Gly Gly Ala Ala Arg Ala Leu Ala His Gly Val Arg Val Leu Glu Asp
      145            150            155            160
Gly Val Asn Tyr Ala Thr Gly Asn Leu Pro Gly Cys Ser Phe Ser Ile
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				165					170					175			
Phe	Leu	Leu	Ala	Leu	Leu	Ser	Cys	Leu	Thr	Val	Pro	Ala	Ser	Ala	Tyr		
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Gln	Val	Arg	Asn	Ser	Ser	Gly	Leu	Tyr	His	Val	Thr	Asn	Asp	Cys	Pro		
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Asn	Ser	Ser	Val	Val	Tyr	Glu	Ala	Ala	Asp	Ala	Ile	Leu	His	Thr	Pro		
	210					215					220						
Gly	Cys	Val	Pro	Cys	Val	Arg	Glu	Gly	Asn	Ala	Ser	Arg	Cys	Trp	Val		
225					230					235					240		
Ala	Val	Thr	Pro	Thr	Val	Ala	Thr	Arg	Asp	Gly	Lys	Leu	Pro	Thr	Thr		
				245					250					255			
Gln	Leu	Arg	Arg	His	Ile	Asp	Leu	Leu	Val	Gly	Ser	Ala	Thr	Leu	Cys		
			260				265						270				
Ser	Ala	Leu	Tyr	Val	Gly	Asp	Leu	Cys	Gly	Ser	Val	Phe	Leu	Val	Gly		
	275					280						285					
Gln	Leu	Phe	Thr	Phe	Ser	Pro	Arg	His	His	Trp	Thr	Thr	Gln	Asp	Cys		
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Asn	Cys	Ser	Ile	Tyr	Pro	Gly	His	Ile	Thr	Gly	His	Arg	Met	Ala	Trp		
305					310					315					320		
Asn	Met	Met	Met	Asn	Trp	Ser	Pro	Thr	Ala	Ala	Leu	Val	Val	Ala	Gln		
				325					330					335			
Leu	Leu	Arg	Ile	Pro	Gln	Ala	Ile	Met	Asp	Met	Ile	Ala	Gly	Ala	His		
			340					345					350				
Trp	Gly	Val	Leu	Ala	Gly	Ile	Lys	Tyr	Phe	Ser	Met	Val	Gly	Asn	Trp		
	355					360						365					
Ala	Lys	Val	Leu	Val	Val	Leu	Leu	Leu	Phe	Ala	Gly	Val	Asp	Ala	Glu		
	370					375					380						
Thr	His	Val	Thr	Gly	Gly	Asn	Ala	Gly	Arg	Thr	Thr	Ala	Gly	Leu	Val		
385					390					395					400		
Gly	Leu	Leu	Thr	Pro	Gly	Ala	Lys	Gln	Asn	Ile	Gln	Leu	Ile	Asn	Thr		
				405					410					415			
Asn	Gly	Ser	Trp	His	Ile	Asn	Ser	Thr	Ala	Leu	Asn	Cys	Asn	Glu	Ser		
			420					425					430				
Leu	Asn	Thr	Gly	Trp	Leu	Ala	Gly	Leu	Phe	Tyr	Gln	His	Lys	Phe	Asn		
	435						440					445					
Ser	Ser	Gly	Cys	Pro	Glu	Arg	Leu	Ala	Ser	Cys	Arg	Arg	Leu	Thr	Asp		
	450					455					460						
Phe	Ala	Gln	Gly	Trp	Gly	Pro	Ile	Ser	Tyr	Ala	Asn	Gly	Ser	Gly	Leu		
465					470					475					480		
Asp	Glu	Arg	Pro	Tyr	Cys	Trp	His	Tyr	Pro	Pro	Arg	Pro	Cys	Gly	Ile		
				485					490					495			
Val	Pro	Ala	Lys	Ser	Val	Cys	Gly	Pro	Val	Tyr	Cys	Phe	Thr	Pro	Ser		
			500					505					510				
Pro	Val	Val	Val	Gly	Thr	Thr	Asp	Arg	Ser	Gly	Ala	Pro	Thr	Tyr	Ser		
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Trp	Gly	Ala	Asn	Asp	Thr	Asp	Val	Phe	Val	Leu	Asn	Asn	Thr	Arg	Pro		
	530					535						540					
Pro	Leu	Gly	Asn	Trp	Phe	Gly	Cys	Thr	Trp	Met	Asn	Ser	Thr	Gly	Phe		
545					550					555					560		
Thr	Lys	Val	Cys	Gly	Ala	Pro	Pro	Cys	Val	Ile	Gly	Gly	Val	Gly	Asn		
				565					570					575			
Asn	Thr	Leu	Leu	Cys	Pro	Thr	Asp	Cys	Phe	Arg	Lys	Tyr	Pro	Glu	Ala		
			580					585					590				
Thr	Tyr	Ser	Arg	Cys	Gly	Ser	Gly	Pro	Arg	Ile	Thr	Pro	Arg	Cys	Met		
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165 170 175 180 185 190 195 200 205 210 215 220 225 230 235 240 245 250 255 260 265 270 275 280 285 290 295 300 305 310 315 320 325 330 335 340 345 350 355 360 365 370 375 380 385 390 395 400 405 410 415 420 425 430 435 440 445 450 455 460 465 470 475 480 485 490 495 500 505 510 515 520 525 530 535 540 545 550 555 560 565 570 575 580 585 590 595 600 605





Gly	Arg	Thr	Gly	Arg	Gly	Lys	Pro	Gly	Ile	Tyr	Arg	Phe	Val	Ala	Pro	1490	1495	1500	
Gly	Glu	Arg	Pro	Ser	Gly	Met	Phe	Asp	Ser	Ser	Val	Leu	Cys	Glu	Cys	1505	1510	1515	1520
Tyr	Asp	Ala	Gly	Cys	Ala	Trp	Tyr	Glu	Leu	Thr	Pro	Ala	Glu	Thr	Thr	1525	1530	1535	
Val	Arg	Leu	Arg	Ala	Tyr	Met	Asn	Thr	Pro	Gly	Leu	Pro	Val	Cys	Gln	1540	1545	1550	
Asp	His	Leu	Gly	Phe	Trp	Glu	Gly	Val	Phe	Thr	Gly	Leu	Thr	His	Ile	1555	1560	1565	
Asp	Ala	His	Phe	Leu	Ser	Gln	Thr	Lys	Gln	Ser	Gly	Glu	Asn	Phe	Pro	1570	1575	1580	
Tyr	Leu	Val	Ala	Tyr	Gln	Ala	Thr	Val	Cys	Ala	Arg	Ala	Gln	Ala	Pro	1585	1590	1595	1600
Pro	Pro	Ser	Trp	Asp	Gln	Met	Arg	Lys	Cys	Leu	Ile	Arg	Leu	Lys	Pro	1605	1610	1615	
Thr	Leu	His	Gly	Pro	Thr	Pro	Leu	Leu	Tyr	Arg	Leu	Gly	Ala	Val	Gln	1620	1625	1630	
Asn	Glu	Val	Thr	Leu	Thr	His	Pro	Ile	Thr	Lys	Tyr	Ile	Met	Thr	Cys	1635	1640	1645	
Met	Ser	Ala	Asp	Leu	Glu	Val	Val	Thr	Ser	Thr	Trp	Val	Leu	Val	Gly	1650	1655	1660	
Gly	Val	Leu	Ala	Ala	Leu	Ala	Ala	Tyr	Cys	Leu	Ser	Thr	Gly	Cys	Val	1665	1670	1675	1680
Val	Ile	Val	Gly	Arg	Ile	Val	Leu	Ser	Gly	Lys	Pro	Ala	Ile	Ile	Pro	1685	1690	1695	
Asp	Arg	Glu	Val	Leu	Tyr	Gln	Glu	Phe	Asp	Glu	Met	Glu	Glu	Cys	Ser	1700	1705	1710	
Gln	His	Leu	Pro	Tyr	Ile	Glu	Gln	Gly	Met	Met	Leu	Ala	Glu	Gln	Phe	1715	1720	1725	
Lys	Gln	Lys	Ala	Leu	Gly	Leu	Leu	Gln	Thr	Ala	Ser	Arg	His	Ala	Glu	1730	1735	1740	
Val	Ile	Thr	Pro	Ala	Val	Gln	Thr	Asn	Trp	Gln	Lys	Leu	Glu	Val	Phe	1745	1750	1755	1760
Trp	Ala	Lys	His	Met	Trp	Asn	Phe	Ile	Ser	Gly	Ile	Gln	Tyr	Leu	Ala	1765	1770	1775	
Gly	Leu	Ser	Thr	Leu	Pro	Gly	Asn	Pro	Ala	Ile	Ala	Ser	Leu	Met	Ala	1780	1785	1790	
Phe	Thr	Ala	Ala	Val	Thr	Ser	Pro	Leu	Thr	Thr	Gly	Gln	Thr	Leu	Leu	1795	1800	1805	
Phe	Asn	Ile	Leu	Gly	Gly	Trp	Val	Ala	Ala	Gln	Leu	Ala	Ala	Pro	Gly	1810	1815	1820	
Ala	Ala	Thr	Ala	Phe	Val	Gly	Ala	Gly	Leu	Ala	Gly	Ala	Ala	Leu	Asp	1825	1830	1835	1840
Ser	Val	Gly	Leu	Gly	Lys	Val	Leu	Val	Asp	Ile	Leu	Ala	Gly	Tyr	Gly	1845	1850	1855	
Ala	Gly	Val	Ala	Gly	Ala	Leu	Val	Ala	Phe	Lys	Ile	Met	Ser	Gly	Glu	1860	1865	1870	
Val	Pro	Ser	Thr	Glu	Asp	Leu	Val	Asn	Leu	Leu	Pro	Ala	Ile	Leu	Ser	1875	1880	1885	
Pro	Gly	Ala	Leu	Ala	Val	Gly	Val	Val	Phe	Ala	Ser	Ile	Leu	Arg	Arg	1890	1895	1900	
Arg	Val	Gly	Pro	Gly	Glu	Gly	Ala	Val	Gln	Trp	Met	Asn	Arg	Leu	Ile	1905	1910	1915	1920
Ala	Phe	Ala	Ser	Arg	Gly	Asn	His	Val	Ser	Pro	Thr	His	Tyr	Val	Pro				



Ser Glu Pro Ala Pro Ser Gly Cys Pro Pro Asp Ser Asp Val Glu Ser  
 2370 2375 2380  
 Tyr Ser Ser Met Pro Pro Leu Glu Gly Glu Pro Gly Asp Pro Asp Leu  
 2385 2390 2395 2400  
 Ser Asp Gly Ser Trp Ser Thr Val Ser Ser Gly Ala Asp Thr Glu Asp  
 2405 2410 2415  
 Val Val Cys Cys Ser Met Ser Tyr Ser Trp Thr Gly Ala Leu Val Thr  
 2420 2425 2430  
 Pro Cys Ala Ala Glu Glu Gln Lys Leu Pro Ile Asn Ala Leu Ser Asn  
 2435 2440 2445  
 Ser Leu Leu Arg His His Asn Leu Val Tyr Ser Thr Thr Ser Arg Ser  
 2450 2455 2460  
 Ala Cys Gln Arg Lys Lys Lys Val Thr Phe Asp Arg Leu Gln Val Leu  
 2465 2470 2475 2480  
 Asp Ser His Tyr Gln Asp Val Leu Lys Glu Val Lys Ala Ala Ala Ser  
 2485 2490 2495  
 Lys Val Lys Ala Asn Leu Leu Ser Val Glu Glu Ala Cys Ser Leu Ala  
 2500 2505 2510  
 Pro Pro His Ser Ala Lys Ser Lys Phe Gly Tyr Gly Ala Lys Asp Val  
 2515 2520 2525  
 Arg Cys His Ala Arg Lys Ala Val Ala His Ile Asn Ser Val Trp Lys  
 2530 2535 2540  
 Asp Leu Leu Glu Asp Ser Val Thr Pro Ile Asp Thr Thr Ile Met Ala  
 2545 2550 2555 2560  
 Lys Asn Glu Val Phe Cys Val Gln Pro Glu Lys Gly Gly Arg Lys Pro  
 2565 2570 2575  
 Ala Arg Leu Ile Val Phe Pro Asp Leu Gly Val Arg Val Cys Glu Lys  
 2580 2585 2590  
 Met Ala Leu Tyr Asp Val Val Ser Lys Leu Pro Leu Ala Val Met Gly  
 2595 2600 2605  
 Ser Ser Tyr Gly Phe Gln Tyr Ser Pro Gly Gln Arg Val Glu Phe Leu  
 2610 2615 2620  
 Val Gln Ala Trp Lys Ser Lys Lys Thr Pro Met Gly Leu Ser Tyr Asp  
 2625 2630 2635 2640  
 Thr Arg Cys Phe Asp Ser Thr Val Thr Glu Ser Asp Ile Arg Thr Glu  
 2645 2650 2655  
 Glu Ala Ile Tyr Gln Cys Cys Asp Leu Asp Pro Gln Ala Arg Val Ala  
 2660 2665 2670  
 Ile Lys Ser Leu Thr Glu Arg Leu Tyr Val Gly Gly Pro Leu Thr Asn  
 2675 2680 2685  
 Ser Arg Gly Glu Asn Cys Gly Tyr Arg Arg Cys Arg Ala Ser Arg Val  
 2690 2695 2700  
 Leu Thr Thr Ser Cys Gly Asn Thr Leu Thr Arg Tyr Ile Lys Ala Arg  
 2705 2710 2715 2720  
 Ala Ala Cys Arg Ala Ala Gly Leu Gln Asp Cys Thr Met Leu Val Cys  
 2725 2730 2735  
 Gly Asp Asp Leu Val Val Ile Cys Glu Ser Ala Gly Val Gln Glu Asp  
 2740 2745 2750  
 Ala Ala Ser Leu Arg Ala Phe Thr Glu Ala Met Thr Arg Tyr Ser Ala  
 2755 2760 2765  
 Pro Pro Gly Asp Pro Pro Gln Pro Glu Tyr Asp Leu Glu Leu Ile Thr  
 2770 2775 2780  
 Ser Cys Ser Ser Asn Val Ser Val Ala His Asp Gly Ala Gly Lys Arg  
 2785 2790 2795 2800  
 Val Tyr Tyr Leu Thr Arg Asp Pro Thr Thr Pro Leu Ala Arg Ala Ala





130		135		140	
Gly Gly Ala Ala Arg Ala Leu Ala His Gly Val Arg Val Leu Glu Asp					
145		150		155	160
Gly Val Asn Tyr Ala Thr Gly Asn Leu Pro Gly Cys Ser Phe Ser Ile					
	165		170		175
Phe Leu Leu Ala Leu Leu					
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<210> 3  
 <211> 197  
 <212> PRT  
 <213> Artificial Sequence

<220>  
 <223> Hepatitis C virus E1 protein sequence

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Gly Leu Tyr His Val Thr Asn Asp Cys Pro Asn Ser Ser Val Val Tyr	
	20 25 30
Glu Ala Ala Asp Ala Ile Leu His Thr Pro Gly Cys Val Pro Cys Val	
	35 40 45
Arg Glu Gly Asn Ala Ser Arg Cys Trp Val Ala Val Thr Pro Thr Val	
	50 55 60
Ala Thr Arg Asp Gly Lys Leu Pro Thr Thr Gln Leu Arg Arg His Ile	
65	70 75 80
Asp Leu Leu Val Gly Ser Ala Thr Leu Cys Ser Ala Leu Tyr Val Gly	
	85 90 95
Asp Leu Cys Gly Ser Val Phe Leu Val Gly Gln Leu Phe Thr Phe Ser	
	100 105 110
Pro Arg His His Trp Thr Thr Gln Asp Cys Asn Cys Ser Ile Tyr Pro	
	115 120 125
Gly His Ile Thr Gly His Arg Met Ala Trp Asn Met Met Asn Trp	
	130 135 140
Ser Pro Thr Ala Ala Leu Val Val Ala Gln Leu Leu Arg Ile Pro Gln	
145	150 155 160
Ala Ile Met Asp Met Ile Ala Gly Ala His Trp Gly Val Leu Ala Gly	
	165 170 175
Ile Lys Tyr Phe Ser Met Val Gly Asn Trp Ala Lys Val Leu Val Val	
	180 185 190
Leu Leu Leu Phe Ala	
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 <212> PRT  
 <213> Artificial Sequence

<220>  
 <223> Hepatitis C virus E2 protein sequence

<400> 4



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			20					25					30			
Thr	His	Gly	Leu	Val	Ser	Phe	Leu	Val	Phe	Phe	Cys	Phe	Ala	Trp	Tyr	
		35					40					45				
Leu	Lys	Gly	Arg	Trp	Val	Pro	Gly	Ala	Val	Tyr	Ala	Leu	Tyr	Gly	Met	
	50					55					60					
Trp	Pro	Leu	Leu	Leu	Leu	Leu	Leu	Ala	Leu	Pro	Gln	Arg	Ala	Tyr	Ala	
65				70						75					80	
Leu	Asp	Thr	Glu	Val	Ala	Ala	Ser	Cys	Gly	Gly	Val	Val	Leu	Val	Gly	
			85						90					95		
Leu	Met	Ala	Leu	Thr	Leu	Ser	Pro	Tyr	Tyr	Lys	Arg	Tyr	Ile	Ser	Trp	
		100						105					110			
Cys	Met	Trp	Trp	Leu	Gln	Tyr	Phe	Leu	Thr	Arg	Val	Glu	Ala	Gln	Leu	
		115					120					125				
His	Val	Trp	Val	Pro	Pro	Leu	Asn	Val	Arg	Gly	Gly	Arg	Asp	Ala	Val	
	130					135					140					
Ile	Leu	Leu	Thr	Cys	Val	Val	His	Pro	Ala	Leu	Val	Phe	Asp	Ile	Thr	
145				150						155					160	
Lys	Leu	Leu	Leu	Ala	Ile	Phe	Gly	Pro	Leu	Trp	Ile	Leu	Gln	Ala	Ser	
			165						170					175		
Leu	Leu	Lys	Val	Pro	Tyr	Phe	Val	Arg	Val	Gln	Gly	Leu	Leu	Arg	Ile	
		180						185				190				
Cys	Ala	Leu	Ala	Arg	Lys	Ile	Ala	Gly	Gly	His	Tyr	Val	Gln	Met	Ala	
		195					200					205				
Ile	Ile	Lys	Leu	Gly	Ala	Leu	Thr	Gly	Thr	Cys	Val	Tyr	Asn	His	Leu	
	210					215					220					
Ala	Pro	Leu	Arg	Asp	Trp	Ala	His	Asn	Gly	Leu	Arg	Asp	Leu	Ala	Val	
225				230						235					240	
Ala	Val	Glu	Pro	Val	Val	Phe	Ser	Arg	Met	Glu	Thr	Lys	Leu	Ile	Thr	
			245						250					255		
Trp	Gly	Ala	Asp	Thr	Ala	Ala	Cys	Gly	Asp	Ile	Ile	Asn	Gly	Leu	Pro	
		260						265					270			
Val	Ser	Ala	Arg	Arg	Gly	Gln	Glu	Ile	Leu	Leu	Gly	Pro	Ala	Asp	Gly	
		275				280						285				
Met	Val	Ser	Lys	Gly	Trp	Arg	Leu	Leu	Ala	Pro	Ile	Thr	Ala	Tyr	Ala	
	290					295					300					
Gln	Gln	Thr	Arg	Gly	Leu	Leu	Gly	Cys	Ile	Ile						
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<210> 6

<211> 613

<212> PRT

<213> Artificial Sequence

<220>

<223> Hepatitis C virus NS3 protein sequence

<400> 6

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Ile	Val	Ser	Thr	Ala	Thr	Gln	Thr	Phe	Leu	Ala	Thr	Cys	Ile	Asn	Gly	
			20					25					30			

Val	Cys	Trp	Thr	Val	Tyr	His	Gly	Ala	Gly	Thr	Arg	Thr	Ile	Ala	Ser			
		35					40					45						
Pro	Lys	Gly	Pro	Val	Ile	Gln	Thr	Tyr	Thr	Asn	Val	Asp	Gln	Asp	Leu			
	50					55					60							
Val	Gly	Trp	Pro	Ala	Pro	Gln	Gly	Ser	Arg	Ser	Leu	Thr	Pro	Cys	Thr			
65					70					75					80			
Cys	Gly	Ser	Ser	Asp	Leu	Tyr	Leu	Val	Thr	Arg	His	Ala	Asp	Val	Ile			
				85					90					95				
Pro	Val	Arg	Arg	Arg	Gly	Asp	Ser	Arg	Gly	Ser	Leu	Leu	Ser	Pro	Arg			
			100					105						110				
Pro	Ile	Ser	Tyr	Leu	Lys	Gly	Ser	Ser	Gly	Gly	Pro	Leu	Leu	Cys	Pro			
		115					120							125				
Thr	Gly	His	Ala	Val	Gly	Leu	Phe	Arg	Ala	Ala	Val	Cys	Thr	Arg	Gly			
	130					135						140						
Val	Ala	Lys	Ala	Val	Asp	Phe	Ile	Pro	Val	Glu	Asn	Leu	Glu	Thr	Thr			
145					150					155					160			
Met	Arg	Ser	Pro	Val	Phe	Thr	Asp	Asn	Ser	Ser	Pro	Pro	Ala	Val	Pro			
				165					170					175				
Gln	Ser	Phe	Gln	Val	Ala	His	Leu	His	Ala	Pro	Thr	Gly	Ser	Gly	Lys			
			180					185						190				
Ser	Thr	Lys	Val	Pro	Ala	Ala	Tyr	Ala	Ala	Lys	Gly	Tyr	Lys	Val	Leu			
		195					200							205				
Val	Leu	Asn	Pro	Ser	Val	Ala	Ala	Thr	Leu	Gly	Phe	Gly	Ala	Tyr	Met			
	210					215						220						
Ser	Lys	Ala	His	Gly	Val	Asp	Pro	Asn	Ile	Arg	Thr	Gly	Val	Arg	Thr			
225					230					235					240			
Ile	Thr	Thr	Gly	Ser	Pro	Ile	Thr	Tyr	Ser	Thr	Tyr	Gly	Lys	Phe	Leu			
				245					250					255				
Ala	Asp	Ala	Gly	Cys	Ser	Gly	Gly	Ala	Tyr	Asp	Ile	Ile	Ile	Cys	Asp			
			260					265						270				
Glu	Cys	His	Ser	Thr	Asp	Ala	Thr	Ser	Ile	Ser	Gly	Ile	Gly	Thr	Val			
		275					280					285						
Leu	Asp	Gln	Ala	Glu	Thr	Ala	Gly	Ala	Arg	Leu	Val	Val	Leu	Ala	Thr			
	290					295						300						
Ala	Thr	Pro	Pro	Gly	Ser	Val	Thr	Val	Ser	His	Pro	Asn	Ile	Glu	Glu			
305					310					315					320			
Val	Ala	Leu	Ser	Thr	Thr	Gly	Glu	Ile	Pro	Phe	Tyr	Gly	Lys	Ala	Ile			
				325					330					335				
Pro	Leu	Glu	Val	Ile	Lys	Gly	Gly	Arg	His	Leu	Ile	Phe	Cys	His	Ser			
			340					345						350				
Lys	Lys	Lys	Cys	Asp	Glu	Leu	Ala	Ala	Lys	Leu	Val	Ala	Leu	Gly	Ile			
		355					360					365						
Asn	Ala	Val	Ala	Tyr	Tyr	Arg	Gly	Leu	Asp	Val	Ser	Val	Ile	Pro	Thr			
	370					375						380						
Ser	Gly	Asp	Val	Val	Val	Val	Ser	Thr	Asp	Ala	Leu	Met	Thr	Gly	Phe			
385				390						395					400			
Thr	Gly	Asp	Phe	Asp	Ser	Val	Ile	Asp	Cys	Asn	Thr	Cys	Val	Thr	Gln			
				405					410					415				
Thr	Val	Asp	Phe	Ser	Leu	Asp	Pro	Thr	Phe	Thr	Ile	Glu	Thr	Thr	Thr			
			420					425					430					
Leu	Pro	Gln	Asp	Ala	Val	Ser	Arg	Thr	Gln	Arg	Arg	Gly	Arg	Thr	Gly			
		435					440					445						
Arg	Gly	Lys	Pro	Gly	Ile	Tyr	Arg	Phe	Val	Ala	Pro	Gly	Glu	Arg	Pro			
	450					455					460							
Ser	Gly	Met	Phe	Asp	Ser	Ser	Val	Leu	Cys	Glu	Cys	Tyr	Asp	Ala	Gly			

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465		470		475		480									
Cys	Ala	Trp	Tyr	Glu	Leu	Thr	Pro	Ala	Glu	Thr	Thr	Val	Arg	Leu	Arg
		485				490								495	
Ala	Tyr	Met	Asn	Thr	Pro	Gly	Leu	Pro	Val	Cys	Gln	Asp	His	Leu	Gly
		500				505								510	
Phe	Trp	Glu	Gly	Val	Phe	Thr	Gly	Leu	Thr	His	Ile	Asp	Ala	His	Phe
		515				520						525			
Leu	Ser	Gln	Thr	Lys	Gln	Ser	Gly	Glu	Asn	Phe	Pro	Tyr	Leu	Val	Ala
		530				535					540				
Tyr	Gln	Ala	Thr	Val	Cys	Ala	Arg	Ala	Gln	Ala	Pro	Pro	Pro	Ser	Trp
545					550					555					560
Asp	Gln	Met	Arg	Lys	Cys	Leu	Ile	Arg	Leu	Lys	Pro	Thr	Leu	His	Gly
				565						570				575	
Pro	Thr	Pro	Leu	Leu	Tyr	Arg	Leu	Gly	Ala	Val	Gln	Asn	Glu	Val	Thr
			580					585					590		
Leu	Thr	His	Pro	Ile	Thr	Lys	Tyr	Ile	Met	Thr	Cys	Met	Ser	Ala	Asp
		595				600						605			
Leu	Glu	Val	Val	Thr											
	610														

<210> 7  
 <211> 54  
 <212> PRT  
 <213> Artificial Sequence

<220>  
 <223> Hepatitis C virus NS4A protein sequence

<400> 7
Ser Thr Trp Val Leu Val Gly Gly Val Leu Ala Ala Leu Ala Ala Tyr
1 5 10 15
Cys Leu Ser Thr Gly Cys Val Val Ile Val Gly Arg Ile Val Leu Ser
20 25 30
Gly Lys Pro Ala Ile Ile Pro Asp Arg Glu Val Leu Tyr Gln Glu Phe
35 40 45
Asp Glu Met Glu Glu Cys
50

<210> 8  
 <211> 260  
 <212> PRT  
 <213> Artificial Sequence

<220>  
 <223> Hepatitis C virus NS4B protein sequence

<400> 8
Ser Gln His Leu Pro Tyr Ile Glu Gln Gly Met Met Leu Ala Glu Gln
1 5 10 15
Phe Lys Gln Lys Ala Leu Gly Leu Leu Gln Thr Ala Ser Arg His Ala
20 25 30
Glu Val Ile Thr Pro Ala Val Gln Thr Asn Trp Gln Lys Leu Glu Val
35 40 45

Phe	Trp	Ala	Lys	His	Met	Trp	Asn	Phe	Ile	Ser	Gly	Ile	Gln	Tyr	Leu
50						55					60				
Ala	Gly	Leu	Ser	Thr	Leu	Pro	Gly	Asn	Pro	Ala	Ile	Ala	Ser	Leu	Met
65					70					75					80
Ala	Phe	Thr	Ala	Ala	Val	Thr	Ser	Pro	Leu	Thr	Thr	Gly	Gln	Thr	Leu
				85					90					95	
Leu	Phe	Asn	Ile	Leu	Gly	Gly	Trp	Val	Ala	Ala	Gln	Leu	Ala	Ala	Pro
			100					105					110		
Gly	Ala	Ala	Thr	Ala	Phe	Val	Gly	Ala	Gly	Leu	Ala	Gly	Ala	Ala	Leu
			115				120					125			
Asp	Ser	Val	Gly	Leu	Gly	Lys	Val	Leu	Val	Asp	Ile	Leu	Ala	Gly	Tyr
			130			135					140				
Gly	Ala	Gly	Val	Ala	Gly	Ala	Leu	Val	Ala	Phe	Lys	Ile	Met	Ser	Gly
145					150					155					160
Glu	Val	Pro	Ser	Thr	Glu	Asp	Leu	Val	Asn	Leu	Leu	Pro	Ala	Ile	Leu
				165					170					175	
Ser	Pro	Gly	Ala	Leu	Ala	Val	Gly	Val	Val	Phe	Ala	Ser	Ile	Leu	Arg
			180					185					190		
Arg	Arg	Val	Gly	Pro	Gly	Glu	Gly	Ala	Val	Gln	Trp	Met	Asn	Arg	Leu
			195				200					205			
Ile	Ala	Phe	Ala	Ser	Arg	Gly	Asn	His	Val	Ser	Pro	Thr	His	Tyr	Val
			210			215					220				
Pro	Glu	Ser	Asp	Ala	Ala	Ala	Arg	Val	Thr	Ala	Ile	Leu	Ser	Ser	Leu
225					230					235					240
Thr	Val	Thr	Gln	Leu	Leu	Arg	Arg	Leu	His	Gln	Trp	Ile	Ser	Ser	Glu
				245					250					255	
Cys	Thr	Thr	Pro												
			260												

<210> 9

<211> 1040

<212> PRT

<213> Artificial Sequence

<220>

<223> Hepatitis C virus NS5A/B protein sequence

<400> 9

Cys	Ser	Gly	Ser	Trp	Leu	Arg	Asp	Ile	Trp	Asp	Trp	Ile	Cys	Glu	Val
1				5					10					15	
Leu	Ser	Asp	Phe	Lys	Thr	Trp	Leu	Lys	Ala	Lys	Leu	Met	Pro	Gln	Leu
			20					25					30		
Pro	Gly	Ile	Pro	Phe	Val	Ser	Cys	Gln	Arg	Gly	Tyr	Arg	Gly	Val	Trp
			35				40					45			
Arg	Gly	Asp	Gly	Ile	Met	His	Thr	Arg	Cys	His	Cys	Gly	Ala	Glu	Ile
			50			55					60				
Thr	Gly	His	Val	Lys	Asn	Gly	Thr	Met	Arg	Ile	Val	Gly	Pro	Arg	Thr
65					70					75					80
Cys	Lys	Asn	Met	Trp	Ser	Gly	Thr	Phe	Phe	Ile	Asn	Ala	Tyr	Thr	Thr
				85					90					95	
Gly	Pro	Cys	Thr	Pro	Leu	Pro	Ala	Pro	Asn	Tyr	Lys	Phe	Ala	Leu	Trp
			100					105					110		
Arg	Val	Ser	Ala	Glu	Glu	Tyr	Val	Glu	Ile	Arg	Arg	Val	Gly	Asp	Phe
			115					120					125		







Ile Tyr His Ser Val Ser His Ala Arg Pro Arg Trp Phe Trp Phe Cys  
 1010 1015 1020  
 Leu Leu Leu Leu Ala Ala Gly Val Gly Ile Tyr Leu Leu Pro Asn Arg  
 1025 1030 1035 1040

<210> 10  
 <211> 226  
 <212> PRT  
 <213> Artificial Sequence

<220>  
 <223> Hepatitis B virus S antigen (HBsAg) sequence

<400> 10  
 Met Glu Asn Ile Thr Ser Gly Phe Leu Gly Pro Leu Leu Val Leu Gln  
 1 5 10 15  
 Ala Gly Phe Phe Leu Leu Thr Arg Ile Leu Thr Ile Pro Gln Ser Leu  
 20 25 30  
 Asp Ser Trp Trp Thr Ser Leu Asn Phe Leu Gly Gly Thr Thr Val Cys  
 35 40 45  
 Leu Gly Gln Asn Ser Gln Ser Pro Thr Ser Asn His Ser Pro Thr Ser  
 50 55 60  
 Cys Pro Pro Thr Cys Pro Gly Tyr Arg Trp Met Cys Leu Arg Arg Phe  
 65 70 75 80  
 Ile Ile Phe Leu Phe Ile Leu Leu Leu Cys Leu Ile Phe Leu Leu Val  
 85 90 95  
 Leu Leu Asp Tyr Gln Gly Met Leu Pro Val Cys Pro Leu Ile Pro Gly  
 100 105 110  
 Ser Ser Thr Thr Ser Thr Gly Pro Cys Arg Thr Cys Met Thr Thr Ala  
 115 120 125  
 Gln Gly Thr Ser Met Tyr Pro Ser Cys Cys Cys Thr Lys Pro Ser Asp  
 130 135 140  
 Gly Asn Cys Thr Cys Ile Pro Ile Pro Ser Ser Trp Ala Phe Gly Lys  
 145 150 155 160  
 Phe Leu Trp Glu Trp Ala Ser Ala Arg Phe Ser Trp Leu Ser Leu Leu  
 165 170 175  
 Val Pro Phe Val Gln Trp Phe Val Gly Leu Ser Pro Thr Val Trp Leu  
 180 185 190  
 Ser Val Ile Trp Met Met Trp Tyr Trp Gly Pro Ser Leu Tyr Ser Ile  
 195 200 205  
 Leu Ser Pro Phe Leu Pro Leu Leu Pro Ile Phe Phe Cys Leu Trp Val  
 210 215 220  
 Tyr Ile  
 225

<210> 11  
 <211> 212  
 <212> PRT  
 <213> Artificial Sequence

<220>  
 <223> Hepatitis B virus C antigen and e antigen  
 (HBcAg/HBeAg) sequence

<400> 11

Met	Gln	Leu	Phe	His	Leu	Cys	Leu	Ile	Ile	Ser	Cys	Ser	Cys	Pro	Thr
1				5					10					15	
Val	Gln	Ala	Ser	Lys	Leu	Cys	Leu	Gly	Trp	Leu	Trp	Gly	Met	Asp	Ile
			20					25					30		
Asp	Pro	Tyr	Lys	Glu	Phe	Gly	Ala	Thr	Val	Glu	Leu	Leu	Ser	Phe	Leu
		35					40					45			
Pro	Ser	Asp	Phe	Phe	Pro	Ser	Val	Arg	Asp	Leu	Leu	Asp	Thr	Ala	Ser
	50					55						60			
Ala	Leu	Tyr	Arg	Glu	Ala	Leu	Glu	Ser	Pro	Glu	His	Cys	Ser	Pro	His
65					70					75					80
His	Thr	Ala	Leu	Arg	Gln	Ala	Ile	Leu	Cys	Trp	Gly	Glu	Leu	Met	Thr
				85					90					95	
Leu	Ala	Thr	Trp	Val	Gly	Val	Asn	Leu	Glu	Asp	Pro	Ala	Ser	Arg	Asp
			100					105					110		
Leu	Val	Val	Ser	Tyr	Val	Asn	Thr	Asn	Met	Gly	Leu	Lys	Phe	Arg	Gln
		115					120					125			
Leu	Leu	Trp	Phe	His	Ile	Ser	Cys	Leu	Thr	Phe	Gly	Arg	Glu	Thr	Val
	130					135					140				
Ile	Glu	Tyr	Leu	Val	Ser	Phe	Gly	Val	Trp	Ile	Arg	Thr	Pro	Pro	Ala
145					150					155					160
Tyr	Arg	Pro	Pro	Asn	Ala	Pro	Ile	Leu	Ser	Thr	Leu	Pro	Glu	Thr	Thr
				165					170				175		
Val	Val	Arg	Arg	Arg	Gly	Arg	Ser	Pro	Arg	Arg	Arg	Thr	Pro	Ser	Pro
			180					185					190		
Arg	Arg	Arg	Arg	Ser	Gln	Ser	Pro	Arg	Arg	Arg	Arg	Ser	Gln	Ser	Arg
		195					200					205			
Glu	Ser	Gln	Cys												
	210														

<210> 12

<211> 2227

<212> PRT

<213> Artificial Sequence

<220>

<223> Hepatitis A virus sequence

<400> 12

Met	Asn	Met	Ser	Lys	Gln	Gly	Ile	Phe	Gln	Thr	Val	Gly	Ser	Gly	Leu
1				5					10					15	
Asp	His	Ile	Leu	Ser	Leu	Ala	Asp	Ile	Glu	Glu	Glu	Gln	Met	Ile	Gln
			20					25					30		
Ser	Val	Asp	Arg	Thr	Ala	Val	Thr	Gly	Ala	Ser	Tyr	Phe	Thr	Ser	Val
		35					40					45			
Asp	Gln	Ser	Ser	Val	His	Thr	Ala	Glu	Val	Gly	Ser	His	Gln	Ile	Glu
	50					55					60				
Pro	Leu	Lys	Thr	Ser	Val	Asp	Lys	Pro	Gly	Ser	Lys	Lys	Thr	Gln	Gly
65					70					75					80
Glu	Lys	Phe	Phe	Leu	Ile	His	Ser	Ala	Asp	Trp	Leu	Thr	Thr	His	Ala
				85					90					95	
Leu	Phe	His	Glu	Val	Ala	Lys	Leu	Asp	Val	Val	Lys	Leu	Leu	Tyr	Asn
			100					105					110		



545	Pro	Glu	Leu	Lys	Pro	Gly	Glu	Ser	Arg	His	Thr	Ser	Asp	His	Met	Ser
					565					570						575
Ile	Tyr	Lys	Phe	Met	Gly	Arg	Ser	His	Phe	Leu	Cys	Thr	Phe	Thr	Phe	
					580					585					590	
Asn	Ser	Asn	Asn	Lys	Glu	Tyr	Thr	Phe	Pro	Ile	Thr	Leu	Ser	Ser	Thr	
					595					600					605	
Ser	Asn	Pro	Pro	His	Gly	Leu	Pro	Ser	Thr	Leu	Arg	Trp	Phe	Phe	Asn	
					610					615					620	
Leu	Phe	Gln	Leu	Tyr	Arg	Gly	Pro	Leu	Asp	Leu	Thr	Ile	Ile	Ile	Thr	
625					630					635					640	
Gly	Ala	Thr	Asp	Val	Asp	Gly	Met	Ala	Trp	Phe	Thr	Pro	Val	Gly	Leu	
					645					650					655	
Ala	Val	Asp	Pro	Trp	Val	Glu	Lys	Glu	Ser	Ala	Leu	Ser	Ile	Asp	Tyr	
					660					665					670	
Lys	Thr	Ala	Leu	Gly	Ala	Val	Arg	Phe	Asn	Thr	Arg	Arg	Thr	Gly	Asn	
					675					680					685	
Ile	Gln	Ile	Arg	Leu	Pro	Trp	Tyr	Ser	Tyr	Leu	Tyr	Ala	Val	Ser	Gly	
					690					695					700	
Ala	Leu	Asp	Gly	Leu	Gly	Asp	Lys	Thr	Asp	Ser	Thr	Phe	Gly	Leu	Phe	
705					710					715					720	
Leu	Phe	Glu	Ile	Ala	Asn	Tyr	Asn	His	Ser	Asp	Glu	Tyr	Leu	Ser	Phe	
					725					730					735	
Ser	Cys	Tyr	Leu	Ser	Val	Thr	Glu	Gln	Ser	Glu	Phe	Tyr	Phe	Pro	Arg	
					740					745					750	
Ala	Pro	Leu	Asn	Ser	Asn	Ala	Met	Leu	Ser	Thr	Glu	Ser	Met	Met	Ser	
					755					760					765	
Arg	Ile	Ala	Ala	Gly	Asp	Leu	Glu	Ser	Ser	Val	Asp	Asp	Pro	Arg	Ser	
					770					775					780	
Glu	Glu	Asp	Arg	Arg	Phe	Glu	Ser	His	Ile	Glu	Cys	Arg	Lys	Pro	Tyr	
785					790					795					800	
Lys	Glu	Leu	Arg	Leu	Glu	Val	Gly	Lys	Gln	Arg	Leu	Lys	Tyr	Ala	Gln	
					805					810					815	
Glu	Glu	Leu	Ser	Asn	Glu	Val	Leu	Pro	Pro	Pro	Arg	Lys	Met	Lys	Gly	
					820					825					830	
Leu	Phe	Ser	Gln	Ala	Lys	Ile	Ser	Leu	Phe	Tyr	Thr	Glu	Glu	His	Glu	
					835					840					845	
Ile	Met	Lys	Phe	Ser	Trp	Arg	Gly	Val	Thr	Ala	Asp	Thr	Arg	Ala	Leu	
					850					855					860	
Arg	Arg	Phe	Gly	Phe	Ser	Leu	Ala	Ala	Gly	Arg	Ser	Val	Trp	Thr	Leu	
865					870					875					880	
Glu	Met	Asp	Ala	Gly	Val	Leu	Thr	Gly	Arg	Leu	Ile	Arg	Leu	Asn	Asp	
					885					890					895	
Glu	Lys	Trp	Thr	Glu	Met	Lys	Asp	Asp	Lys	Ile	Val	Ser	Leu	Ile	Glu	
					900					905					910	
Lys	Phe	Thr	Ser	Asn	Lys	Tyr	Trp	Ser	Lys	Val	Asn	Phe	Pro	His	Gly	
					915					920					925	
Met	Leu	Asp	Leu	Glu	Glu	Ile	Ala	Ala	Asn	Ser	Lys	Asp	Phe	Pro	Asn	
					930					935					940	
Met	Ser	Glu	Thr	Asp	Leu	Cys	Phe	Leu	Leu	His	Trp	Leu	Asn	Pro	Lys	
945					950					955					960	
Lys	Ile	Asn	Leu	Ala	Asp	Arg	Met	Leu	Gly	Leu	Ser	Gly	Val	Gln	Glu	
					965					970					975	
Ile	Lys	Glu	Gln	Gly	Val	Gly	Leu	Ile	Ala	Glu	Cys	Arg	Thr	Phe	Leu	
					980					985					990	



Pro Ser Gly Glu	Pro Ser Asn Trp Lys Leu	Ser Ser Phe Phe	Gln Ser
1445	1450		1455
Val Thr Asn His Lys Trp	Val Ala Val Gly Ala	Ala Val Gly Ile	Leu
1460	1465		1470
Gly Val Leu Val Gly Gly Trp	Phe Val Tyr Lys His	Phe Ser Arg	Lys
1475	1480		1485
Glu Glu Glu Pro Ile Pro	Ala Glu Gly Val Tyr	His Gly Val Thr	Lys
1490	1495		1500
Pro Lys Gln Val Ile Lys	Leu Asp Ala Asp	Pro Val Glu Ser	Gln Ser
1505	1510		1515
Thr Leu Glu Ile Ala Gly	Leu Val Arg Lys	Asn Leu Val Gln	Phe Gly
1525	1530		1535
Val Gly Glu Lys Asn Gly	Cys Val Arg Trp	Val Met Asn Ala	Leu Gly
1540	1545		1550
Val Lys Asp Asp Trp Leu	Leu Val Pro Ser His	Ala Tyr Lys Phe	Glu
1555	1560		1565
Lys Asp Tyr Glu Met Met	Glu Phe Tyr Phe	Asn Arg Gly Gly	Thr Tyr
1570	1575		1580
Tyr Ser Ile Ser Ala Gly	Asn Val Val Ile	Gln Ser Leu Asp	Val Gly
1585	1590		1595
Phe Gln Asp Val Val Leu	Met Lys Val Pro Thr	Ile Pro Lys Phe	Arg
1605	1610		1615
Asp Ile Thr Gln His Phe	Ile Lys Lys Gly Asp	Val Pro Arg Ala	Leu
1620	1625		1630
Asn Arg Leu Ala Thr Leu	Val Thr Thr Val Asn	Gly Thr Pro Met	Leu
1635	1640		1645
Ile Ser Glu Gly Pro Leu	Lys Met Glu Glu Lys	Ala Thr Tyr Val	His
1650	1655		1660
Lys Lys Asn Asp Gly Thr	Thr Val Asp Leu Thr	Val Asp Gln Ala	Trp
1665	1670		1675
Arg Gly Lys Gly Glu Gly	Leu Pro Gly Met Cys	Gly Gly Ala Leu	Val
1685	1690		1695
Ser Ser Asn Gln Ser Ile	Gln Asn Ala Ile Leu	Gly Ile His Val	Ala
1700	1705		1710
Gly Gly Asn Ser Ile Leu	Val Ala Lys Leu Val	Thr Gln Glu Met	Phe
1715	1720		1725
Gln Asn Ile Asp Lys Lys	Ile Glu Ser Gln Arg	Ile Met Lys Val	Glu
1730	1735		1740
Phe Thr Gln Cys Ser Met	Asn Val Val Ser Lys	Thr Leu Phe Arg	Lys
1745	1750		1755
Ser Pro Ile His His His	Ile Asp Lys Thr Met	Ile Asn Phe Pro	Ala
1765	1770		1775
Ala Met Pro Phe Ser Lys	Ala Glu Ile Asp Pro	Met Ala Met Met	Leu
1780	1785		1790
Ser Lys Tyr Ser Leu Pro	Ile Val Glu Glu Pro	Glu Asp Tyr Lys	Glu
1795	1800		1805
Ala Ser Val Phe Tyr Gln	Asn Lys Ile Val Gly	Lys Thr Gln Leu	Val
1810	1815		1820
Asp Asp Phe Leu Asp Leu	Asp Met Ala Ile Thr	Gly Ala Pro Gly	Ile
1825	1830		1835
Asp Ala Ile Asn Met Asp	Ser Ser Pro Gly Phe	Pro Tyr Val Gln	Glu
1845	1850		1855
Lys Leu Thr Lys Arg Asp	Leu Ile Trp Leu Asp	Glu Asn Gly Leu	Leu
1860	1865		1870

Leu Gly Val His Pro Arg	Leu Ala Gln Arg Ile Leu Phe Asn Thr Val
1875	1880 1885
Met Met Glu Asn Cys Ser Asp Leu Asp Val Val Phe Thr Thr Cys Pro	
1890	1895 1900
Lys Asp Glu Leu Arg Pro Leu Glu Lys Val Leu Glu Ser Lys Thr Arg	
1905	1910 1915 1920
Ala Ile Asp Ala Cys Pro Leu Asp Tyr Thr Ile Leu Cys Arg Met Tyr	
	1925 1930 1935
Trp Gly Pro Ala Ile Ser Tyr Phe His Leu Asn Pro Gly Phe His Thr	
	1940 1945 1950
Gly Val Ala Ile Gly Ile Asp Pro Asp Arg Gln Trp Asp Glu Leu Phe	
	1955 1960 1965
Lys Thr Met Ile Arg Phe Gly Asp Val Gly Leu Asp Leu Asp Phe Ser	
	1970 1975 1980
Ala Phe Asp Ala Ser Leu Ser Pro Phe Met Ile Arg Glu Ala Gly Arg	
1985	1990 1995 2000
Ile Met Ser Glu Leu Ser Gly Thr Pro Ser His Phe Gly Thr Ala Leu	
	2005 2010 2015
Ile Asn Thr Ile Ile Tyr Ser Lys His Leu Leu Tyr Asn Cys Cys Tyr	
	2020 2025 2030
His Val Cys Gly Ser Met Pro Ser Gly Ser Pro Cys Thr Ala Leu Leu	
	2035 2040 2045
Asn Ser Ile Ile Asn Asn Ile Asn Leu Tyr Tyr Val Phe Ser Lys Ile	
	2050 2055 2060
Phe Gly Lys Ser Pro Val Phe Phe Cys Gln Ala Leu Arg Ile Leu Cys	
2065	2070 2075 2080
Tyr Gly Asp Asp Val Leu Ile Val Phe Ser Arg Asp Val Gln Ile Asp	
	2085 2090 2095
Asn Leu Asp Leu Ile Gly Gln Lys Ile Val Asp Glu Phe Lys Lys Leu	
	2100 / 2105 2110
Gly Met Thr Ala Thr Ser Ala Asp Lys Asn Val Pro Gln Leu Lys Pro	
	2115 2120 2125
Val Ser Glu Leu Thr Phe Leu Lys Arg Ser Phe Asn Leu Val Glu Asp	
	2130 2135 2140
Arg Ile Arg Pro Ala Ile Ser Glu Lys Thr Ile Trp Ser Leu Met Ala	
2145	2150 2155 2160
Trp Gln Arg Ser Asn Ala Glu Phe Glu Gln Asn Leu Glu Asn Ala Gln	
	2165 2170 2175
Trp Phe Ala Phe Met His Gly Tyr Glu Phe Tyr Gln Lys Phe Tyr Tyr	
	2180 2185 2190
Phe Val Gln Ser Cys Leu Glu Lys Glu Met Ile Glu Tyr Arg Leu Lys	
	2195 2200 2205
Ser Tyr Asp Trp Trp Arg Met Arg Phe Tyr Asp Gln Cys Phe Ile Cys	
	2210 2215 2220
Asp Leu Ser	
2225	

<210> 13

<211> 9416

<212> DNA

<213> Artificial Sequence

<220>

<223> Hepatitis C virus sequence

<400> 13

gccagccccc	tgatgggggc	gacactccac	catgaatcac	tcccctgtga	ggaactactg	60
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ccccctccc	gggagagcca	tagtgggtctg	cggaaaccgg	gagtacaccg	gaattgccag	180
gacgaccggg	tcctttcttg	gataaaccgg	ctcaatgcct	ggagatttgg	gcgtgcccc	240
gcaagactgc	tagccgagta	gtgttgggtc	gcgaaaggcc	ttgtgggtact	gcctgatagg	300
gtgcttgcga	gtgccccggg	aggtctcgta	gaccgtgcac	catgagcacg	aatcctaacc	360
ctcaaagaaa	aaccaaacgt	aacaccaacc	gtcgcccaca	ggacgtcaag	ttcccgggtg	420
gcggtcagat	cgttgggtgga	gtttacttgt	tgccgcgcag	gggccctaga	ttgggtgtgc	480
gcgcgacgag	gaagacttcc	gagcgggtcgc	aacctcgagg	tagacgtcag	cctatcccca	540
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ggggcccccac	agacccccgg	cgtaggtcgc	gcaatttggg	taaggctatc	gataccctta	720
cgtgcggcctt	cgccgacctc	atgggggtaca	taccgtcgt	cggcgcccct	cttgaggcg	780
ctgccagggc	cctggcgcac	ggcgtccggg	ttctggaaga	cggcgtgaac	tatgcaacag	840
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tgcccgccttc	agcctaccaa	gtgcgcaatt	cctcggggct	ttaccatgtc	accaatgatt	960
gccctaactc	gagtgttgtg	tacgaggcgg	ccgatgccat	cctgcacact	ccggggtgtg	1020
tcccttgctg	tcgcgagggg	aacgcctcga	gggtgtgggt	ggcggtgacc	cccacgggtg	1080
ccaccagggg	cggcaaacctc	cccacaacgc	agcttcgacg	tcatatcgat	ctgcttgcgc	1140
ggagcgccac	cctctgctcg	gccctctacg	tgggggacct	gtgcgggtct	gtctttcttg	1200
ttgggtcaact	gtttaccttc	tctcccaggc	accactggac	gacgcaagac	tgcaattgtt	1260
ctatctatcc	cggccatata	acgggtcatc	gcatggcatg	gaatatgatg	atgaactggg	1320
cccctacggc	agcgttgggtg	gtagctcagc	tgctccgaat	cccacaagcc	atcatggaca	1380
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actgggcgaa	ggctctggta	gtgctgctgc	tatttgccgg	cgctcgacgcg	gaaaccacgc	1500
tcaccggggg	aaatgccggc	cgaccacgcg	ctgggcttgt	tggtctcctt	acaccaggcg	1560
ccaagcagaa	catccaactg	atcaacacca	acggcagttg	gcacatcaat	agcacggcct	1620
tgaactgcaa	tgaaagcctt	aacaccggct	ggtagcagg	gctcttctat	cagcacaat	1680
tcaactcttc	aggtgtcct	gagaggttgg	ccagctgccg	acgccttacc	gattttgccc	1740
agggctgggg	tcctatcagt	tatgccaacg	gaagcggcct	cgacgaacgc	ccctactgct	1800
ggcactacct	tccaagacct	tgtggcattg	tgcccgcaaa	gagcgtgtgt	ggcccgggat	1860
attgcttcac	tcccagcccc	gtgggtgggtg	gaacgaccga	caggtcgggc	gcgcctacct	1920
acagctgggg	tgcaaatgat	acggatgtct	tcgtccttaa	caacaccagg	ccaccgctgg	1980
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<213> Artificial Sequence

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<223> Hepatitis B virus sequence

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<223> Hepatitis A virus sequence

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<210> 17

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<212> PRT

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<223> Hepatitis C virus NS3/4A peptide

<400> 17

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Glu Val Gln Ile Val Ser Thr Ala Ala Gln Thr Phe Leu Ala Thr Cys
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Gln Asp Leu Val Gly Trp Pro Ala Pro Gln Gly Ala Arg Ser Leu Thr
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Pro Cys Thr Cys Gly Ser Ser Asp Leu Tyr Leu Val Thr Arg His Ala
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Asp Val Ile Pro Val Arg Arg Arg Gly Asp Gly Arg Gly Ser Leu Leu
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Glu	Val	Thr	Leu	Thr	His	Pro	Val	Thr	Lys	Tyr	Ile	Met	Thr	Cys	Met	
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Val Leu Ala Ala Leu Ala Ala Tyr Cys Leu Ser Thr Gly Cys Val Val  
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 Glu Val Gln Ile Val Ser Thr Ala Ala Gln Thr Phe Leu Ala Thr Cys  
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 Ile Ala Ser Pro Lys Gly Pro Val Ile Gln Met Tyr Thr Asn Val Asp  
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 Gln Asp Leu Val Gly Trp Pro Ala Pro Gln Gly Ala Arg Ser Leu Thr



His Leu Glu Phe Trp Glu Gly Val Phe Thr Gly Leu Thr His Ile Asp  
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 Pro Ser Trp Asp Gln Met Trp Lys Cys Leu Ile Arg Leu Lys Pro Thr  
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<211> 686

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 Glu Val Gln Ile Val Ser Thr Ala Ala Gln Thr Phe Leu Ala Thr Cys  
 35 40 45  
 Ile Asn Gly Val Cys Trp Thr Val Tyr His Gly Ala Gly Thr Arg Thr  
 50 55 60  
 Ile Ala Ser Pro Lys Gly Pro Val Ile Gln Met Tyr Thr Asn Val Asp  
 65 70 75 80  
 Gln Asp Leu Val Gly Trp Pro Ala Pro Gln Gly Ala Arg Ser Leu Thr



His	Leu	Glu	Phe	Trp	Glu	Gly	Val	Phe	Thr	Gly	Leu	Thr	His	Ile	Asp
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Ala	His	Phe	Leu	Ser	Gln	Thr	Lys	Gln	Ser	Gly	Glu	Asn	Leu	Pro	Tyr
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Leu	Val	Ala	Tyr	Gln	Ala	Thr	Val	Cys	Ala	Arg	Ala	Gln	Ala	Pro	Pro
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Pro	Ser	Trp	Asp	Gln	Met	Trp	Lys	Cys	Leu	Ile	Arg	Leu	Lys	Pro	Thr
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Leu	His	Gly	Pro	Thr	Pro	Leu	Leu	Tyr	Arg	Leu	Gly	Ala	Val	Gln	Asn
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Glu	Val	Thr	Leu	Thr	His	Pro	Val	Thr	Lys	Tyr	Ile	Met	Thr	Cys	Met
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Ile	Val	Gly	Arg	Ile	Val	Leu	Ser	Gly	Lys	Pro	Ala	Ile	Ile	Pro	Asp
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<210> 32  
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<400> 32

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Gln	Asp	Leu	Val	Gly	Trp	Pro	Ala	Pro	Gln	Gly	Ala	Arg	Ser	Leu	Thr
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Pro	Cys	Thr	Cys	Gly	Ser	Ser	Asp	Leu	Tyr	Leu	Val	Thr	Arg	His	Ala
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Asp	Val	Ile	Pro	Val	Arg	Arg	Arg	Gly	Asp	Gly	Arg	Gly	Ser	Leu	Leu
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Thr	Arg	Gly	Val	Ala	Lys	Ala	Val	Asp	Phe	Ile	Pro	Val	Glu	Ser	Leu
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Ile	Val	Gly	Arg	Ile	Val	Leu	Ser	Gly	Lys	Pro	Ala	Ile	Ile	Pro	Asp
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<210> 43  
<211> 686  
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[illegible]

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Arg	Thr	Gly	Arg	Gly	Lys	Pro	Gly	Ile	Tyr	Arg	Phe	Val	Ala	Pro	Gly
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Glu	Arg	Pro	Ser	Gly	Met	Phe	Asp	Ser	Ser	Val	Leu	Cys	Glu	Cys	Tyr
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His	Leu	Glu	Phe	Trp	Glu	Gly	Val	Phe	Thr	Gly	Leu	Thr	His	Ile	Asp
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Ala	His	Phe	Leu	Ser	Gln	Thr	Lys	Gln	Ser	Gly	Glu	Asn	Leu	Pro	Tyr
545					550					555					560
Leu	Val	Ala	Tyr	Gln	Ala	Thr	Val	Cys	Ala	Arg	Ala	Gln	Ala	Pro	Pro
				565					570					575	
Pro	Ser	Trp	Asp	Gln	Met	Trp	Lys	Cys	Leu	Ile	Arg	Leu	Lys	Pro	Thr
			580					585					590		
Leu	His	Gly	Pro	Thr	Pro	Leu	Leu	Tyr	Arg	Leu	Gly	Ala	Val	Gln	Asn
		595					600					605			
Glu	Val	Thr	Leu	Thr	His	Pro	Val	Thr	Lys	Tyr	Ile	Met	Thr	Cys	Met
	610					615					620				
Ser	Ala	Asp	Leu	Glu	Val	Val	Thr	Pro	Thr	Trp	Val	Leu	Val	Gly	Gly
625					630					635					640
Val	Leu	Ala	Ala	Leu	Ala	Ala	Tyr	Cys	Leu	Ser	Thr	Gly	Cys	Val	Val
				645					650					655	
Ile	Val	Gly	Arg	Ile	Val	Leu	Ser	Gly	Lys	Pro	Ala	Ile	Ile	Pro	Asp
			660					665					670		
Arg	Glu	Val	Leu	Tyr	Arg	Glu	Phe	Asp	Glu	Met	Glu	Glu	Cys		
		675					680					685			

<210> 44

<211> 686

<212> PRT

<213> Artificial Sequence

<220>

<223> Mutant Hepatitis C virus NS3/4A

<400> 44

Met	Ala	Pro	Ile	Thr	Ala	Tyr	Ala	Gln	Gln	Thr	Arg	Gly	Leu	Leu	Gly
1				5					10					15	
Cys	Ile	Ile	Thr	Ser	Leu	Thr	Gly	Arg	Asp	Lys	Asn	Gln	Val	Glu	Gly
			20					25					30		
Glu	Val	Gln	Ile	Val	Ser	Thr	Ala	Ala	Gln	Thr	Phe	Leu	Ala	Thr	Cys
		35					40					45			
Ile	Asn	Gly	Val	Cys	Trp	Thr	Val	Tyr	His	Gly	Ala	Gly	Thr	Arg	Thr
	50					55					60				
Ile	Ala	Ser	Pro	Lys	Gly	Pro	Val	Ile	Gln	Met	Tyr	Thr	Asn	Val	Asp
65					70					75					80
Gln	Asp	Leu	Val	Gly	Trp	Pro	Ala	Pro	Gln	Gly	Ala	Arg	Ser	Leu	Thr
				85					90					95	

Pro	Cys	Thr	Cys	Gly	Ser	Ser	Asp	Leu	Tyr	Leu	Val	Thr	Arg	His	Ala		
			100					105					110				
Asp	Val	Ile	Pro	Val	Arg	Arg	Arg	Gly	Asp	Gly	Arg	Gly	Ser	Leu	Leu		
		115					120					125					
Ser	Pro	Arg	Pro	Ile	Ser	Tyr	Leu	Lys	Gly	Ser	Ser	Gly	Gly	Pro	Leu		
		130				135					140						
Leu	Cys	Pro	Ala	Gly	His	Ala	Val	Gly	Ile	Phe	Arg	Ala	Ala	Val	Cys		
145					150					155					160		
Thr	Arg	Gly	Val	Ala	Lys	Ala	Val	Asp	Phe	Ile	Pro	Val	Glu	Ser	Leu		
				165					170						175		
Glu	Thr	Thr	Met	Arg	Ser	Pro	Val	Phe	Ser	Asp	Asn	Ser	Ser	Pro	Pro		
			180					185					190				
Ala	Val	Pro	Gln	Ser	Tyr	Gln	Val	Ala	His	Leu	His	Ala	Pro	Thr	Gly		
		195					200					205					
Ser	Gly	Lys	Ser	Thr	Lys	Val	Pro	Ala	Ala	Tyr	Ala	Ala	Gln	Gly	Tyr		
		210				215					220						
Lys	Val	Leu	Val	Leu	Asn	Pro	Ser	Val	Ala	Ala	Thr	Met	Gly	Phe	Gly		
225					230					235					240		
Ala	Tyr	Met	Ser	Lys	Ala	His	Gly	Ile	Asp	Pro	Asn	Ile	Arg	Thr	Gly		
				245					250						255		
Val	Arg	Thr	Ile	Thr	Thr	Gly	Ser	Pro	Ile	Thr	Tyr	Ser	Thr	Tyr	Gly		
			260					265					270				
Lys	Phe	Leu	Ala	Asp	Gly	Gly	Cys	Ser	Gly	Gly	Ala	Tyr	Asp	Ile	Ile		
		275					280					285					
Ile	Cys	Asp	Glu	Cys	His	Ser	Thr	Asp	Ala	Thr	Ser	Ile	Leu	Gly	Ile		
		290				295					300						
Gly	Thr	Val	Leu	Asp	Gln	Ala	Glu	Thr	Ala	Gly	Ala	Arg	Leu	Thr	Val		
305					310					315					320		
Leu	Ala	Thr	Ala	Thr	Pro	Pro	Gly	Ser	Val	Thr	Val	Pro	His	Pro	Asn		
				325					330						335		
Ile	Glu	Glu	Val	Ala	Leu	Ser	Thr	Thr	Gly	Glu	Ile	Pro	Phe	Tyr	Gly		
			340					345					350				
Lys	Ala	Ile	Pro	Leu	Glu	Ala	Ile	Lys	Gly	Gly	Arg	His	Leu	Ile	Phe		
		355					360					365					
Cys	His	Ser	Lys	Lys	Lys	Cys	Asp	Glu	Leu	Ala	Ala	Lys	Leu	Val	Ala		
		370				375					380						
Leu	Gly	Val	Asn	Ala	Val	Ala	Tyr	Tyr	Arg	Gly	Leu	Asp	Val	Ser	Val		
385					390					395					400		
Ile	Pro	Thr	Ser	Gly	Asp	Val	Val	Val	Val	Ala	Thr	Asp	Ala	Leu	Met		
				405					410						415		
Thr	Gly	Phe	Thr	Gly	Asp	Phe	Asp	Ser	Val	Ile	Asp	Cys	Asn	Thr	Cys		
			420					425					430				
Val	Thr	Gln	Thr	Val	Asp	Phe	Ser	Leu	Asp	Pro	Thr	Phe	Thr	Ile	Glu		
		435					440					445					
Thr	Ile	Thr	Leu	Pro	Gln	Asp	Ala	Val	Ser	Arg	Thr	Gln	Arg	Arg	Gly		
		450				455					460						
Arg	Thr	Gly	Arg	Gly	Lys	Pro	Gly	Ile	Tyr	Arg	Phe	Val	Ala	Pro	Gly		
465					470					475					480		
Glu	Arg	Pro	Ser	Gly	Met	Phe	Asp	Ser	Ser	Val	Leu	Cys	Glu	Cys	Tyr		
				485					490						495		
Asp	Ala	Gly	Cys	Ala	Trp	Tyr	Glu	Leu	Thr	Pro	Ala	Glu	Thr	Val			
			500					505					510				
Arg	Leu	Arg	Ala	Tyr	Met	Asn	Thr	Pro	Gly	Leu	Pro	Val	Cys	Gln	Asp		
		515					520					525					
His	Leu	Glu	Phe	Trp	Glu	Gly	Val	Phe	Thr	Gly	Leu	Thr	His	Ile	Asp		

100 105 110 115 120 125 130 135 140 145 150 155 160 165 170 175 180 185 190 195 200 205 210 215 220 225 230 235 240 245 250 255 260 265 270 275 280 285 290 295 300 305 310 315 320 325 330 335 340 345 350 355 360 365 370 375 380 385 390 395 400 405 410 415 420 425 430 435 440 445 450 455 460 465 470 475 480 485 490 495 500 505 510 515 520 525

530		535		540
Ala His Phe Leu Ser Gln Thr Lys Gln Ser Gly Glu Asn Leu Pro Tyr				
545		550		555
Leu Val Ala Tyr Gln Ala Thr Val Cys Ala Arg Ala Gln Ala Pro Pro				
	565		570	575
Pro Ser Trp Asp Gln Met Trp Lys Cys Leu Ile Arg Leu Lys Pro Thr				
	580		585	590
Leu His Gly Pro Thr Pro Leu Leu Tyr Arg Leu Gly Ala Val Gln Asn				
	595		600	605
Glu Val Thr Leu Thr His Pro Val Thr Lys Tyr Ile Met Thr Cys Met				
	610		615	620
Ser Ala Asp Leu Glu Val Val Arg Pro Thr Trp Val Leu Val Gly Gly				
625		630		635
Val Leu Ala Ala Leu Ala Ala Tyr Cys Leu Ser Thr Gly Cys Val Val				
	645		650	655
Ile Val Gly Arg Ile Val Leu Ser Gly Lys Pro Ala Ile Ile Pro Asp				
	660		665	670
Arg Glu Val Leu Tyr Arg Glu Phe Asp Glu Met Glu Glu Cys				
	675		680	685

<210> 45

<211> 686

<212> PRT

<213> Artificial Sequence

<220>

<223> Mutant Hepatitis C virus NS3/4A

<400> 45

Met Ala Pro Ile Thr Ala Tyr Ala Gln Gln Thr Arg Gly Leu Leu Gly		
1	5	10
Cys Ile Ile Thr Ser Leu Thr Gly Arg Asp Lys Asn Gln Val Glu Gly		
	20	25
Glu Val Gln Ile Val Ser Thr Ala Ala Gln Thr Phe Leu Ala Thr Cys		
	35	40
Ile Asn Gly Val Cys Trp Thr Val Tyr His Gly Ala Gly Thr Arg Thr		
	50	55
Ile Ala Ser Pro Lys Gly Pro Val Ile Gln Met Tyr Thr Asn Val Asp		
65	70	75
Gln Asp Leu Val Gly Trp Pro Ala Pro Gln Gly Ala Arg Ser Leu Thr		
	85	90
Pro Cys Thr Cys Gly Ser Ser Asp Leu Tyr Leu Val Thr Arg His Ala		
	100	105
Asp Val Ile Pro Val Arg Arg Arg Gly Asp Gly Arg Gly Ser Leu Leu		
	115	120
Ser Pro Arg Pro Ile Ser Tyr Leu Lys Gly Ser Ser Gly Gly Pro Leu		
	130	135
Leu Cys Pro Ala Gly His Ala Val Gly Ile Phe Arg Ala Ala Val Cys		
145	150	155
Thr Arg Gly Val Ala Lys Ala Val Asp Phe Ile Pro Val Glu Ser Leu		
	165	170
Glu Thr Thr Met Arg Ser Pro Val Phe Ser Asp Asn Ser Ser Pro Pro		
	180	185
Ala Val Pro Gln Ser Tyr Gln Val Ala His Leu His Ala Pro Thr Gly		
		190





Val	Leu	Ala	Ala	Leu	Ala	Ala	Tyr	Cys	Leu	Ser	Thr	Gly	Cys	Val	Val
				645					650					655	
Ile	Val	Gly	Arg	Ile	Val	Leu	Ser	Gly	Lys	Pro	Ala	Ile	Ile	Pro	Asp
			660					665					670		
Arg	Glu	Val	Leu	Tyr	Arg	Glu	Phe	Asp	Glu	Met	Glu	Glu	Cys		
		675					680					685			

<210> 46  
 <211> 686  
 <212> PRT  
 <213> Artificial Sequence

<220>  
 <223> Mutant Hepatitis C virus NS3/4A

<400> 46

Met	Ala	Pro	Ile	Thr	Ala	Tyr	Ala	Gln	Gln	Thr	Arg	Gly	Leu	Leu	Gly
1				5				10					15		
Cys	Ile	Ile	Thr	Ser	Leu	Thr	Gly	Arg	Asp	Lys	Asn	Gln	Val	Glu	Gly
			20				25					30			
Glu	Val	Gln	Ile	Val	Ser	Thr	Ala	Ala	Gln	Thr	Phe	Leu	Ala	Thr	Cys
		35					40					45			
Ile	Asn	Gly	Val	Cys	Trp	Thr	Val	Tyr	His	Gly	Ala	Gly	Thr	Arg	Thr
	50					55				60					
Ile	Ala	Ser	Pro	Lys	Gly	Pro	Val	Ile	Gln	Met	Tyr	Thr	Asn	Val	Asp
65				70					75					80	
Gln	Asp	Leu	Val	Gly	Trp	Pro	Ala	Pro	Gln	Gly	Ala	Arg	Ser	Leu	Thr
				85					90					95	
Pro	Cys	Thr	Cys	Gly	Ser	Ser	Asp	Leu	Tyr	Leu	Val	Thr	Arg	His	Ala
			100					105					110		
Asp	Val	Ile	Pro	Val	Arg	Arg	Arg	Gly	Asp	Gly	Arg	Gly	Ser	Leu	Leu
		115					120					125			
Ser	Pro	Arg	Pro	Ile	Ser	Tyr	Leu	Lys	Gly	Ser	Ser	Gly	Gly	Pro	Leu
		130				135					140				
Leu	Cys	Pro	Ala	Gly	His	Ala	Val	Gly	Ile	Phe	Arg	Ala	Ala	Val	Cys
145				150						155				160	
Thr	Arg	Gly	Val	Ala	Lys	Ala	Val	Asp	Phe	Ile	Pro	Val	Glu	Ser	Leu
				165					170					175	
Glu	Thr	Thr	Met	Arg	Ser	Pro	Val	Phe	Ser	Asp	Asn	Ser	Ser	Pro	Pro
			180					185					190		
Ala	Val	Pro	Gln	Ser	Tyr	Gln	Val	Ala	His	Leu	His	Ala	Pro	Thr	Gly
		195					200					205			
Ser	Gly	Lys	Ser	Thr	Lys	Val	Pro	Ala	Ala	Tyr	Ala	Ala	Gln	Gly	Tyr
		210				215					220				
Lys	Val	Leu	Val	Leu	Asn	Pro	Ser	Val	Ala	Ala	Thr	Met	Gly	Phe	Gly
225				230						235				240	
Ala	Tyr	Met	Ser	Lys	Ala	His	Gly	Ile	Asp	Pro	Asn	Ile	Arg	Thr	Gly
				245					250					255	
Val	Arg	Thr	Ile	Thr	Thr	Gly	Ser	Pro	Ile	Thr	Tyr	Ser	Thr	Tyr	Gly
			260					265					270		
Lys	Phe	Leu	Ala	Asp	Gly	Gly	Cys	Ser	Gly	Gly	Ala	Tyr	Asp	Ile	Ile
		275					280					285			
Ile	Cys	Asp	Glu	Cys	His	Ser	Thr	Asp	Ala	Thr	Ser	Ile	Leu	Gly	Ile
	290					295					300				

Gly	Thr	Val	Leu	Asp	Gln	Ala	Glu	Thr	Ala	Gly	Ala	Arg	Leu	Thr	Val	305	310	315	320
Leu	Ala	Thr	Ala	Thr	Pro	Pro	Gly	Ser	Val	Thr	Val	Pro	His	Pro	Asn	325	330	335	
Ile	Glu	Glu	Val	Ala	Leu	Ser	Thr	Thr	Gly	Glu	Ile	Pro	Phe	Tyr	Gly	340	345	350	
Lys	Ala	Ile	Pro	Leu	Glu	Ala	Ile	Lys	Gly	Gly	Arg	His	Leu	Ile	Phe	355	360	365	
Cys	His	Ser	Lys	Lys	Lys	Cys	Asp	Glu	Leu	Ala	Ala	Lys	Leu	Val	Ala	370	375	380	
Leu	Gly	Val	Asn	Ala	Val	Ala	Tyr	Tyr	Arg	Gly	Leu	Asp	Val	Ser	Val	385	390	395	400
Ile	Pro	Thr	Ser	Gly	Asp	Val	Val	Val	Val	Ala	Thr	Asp	Ala	Leu	Met	405	410	415	
Thr	Gly	Phe	Thr	Gly	Asp	Phe	Asp	Ser	Val	Ile	Asp	Cys	Asn	Thr	Cys	420	425	430	
Val	Thr	Gln	Thr	Val	Asp	Phe	Ser	Leu	Asp	Pro	Thr	Phe	Thr	Ile	Glu	435	440	445	
Thr	Ile	Thr	Leu	Pro	Gln	Asp	Ala	Val	Ser	Arg	Thr	Gln	Arg	Arg	Gly	450	455	460	
Arg	Thr	Gly	Arg	Gly	Lys	Pro	Gly	Ile	Tyr	Arg	Phe	Val	Ala	Pro	Gly	465	470	475	480
Glu	Arg	Pro	Ser	Gly	Met	Phe	Asp	Ser	Ser	Val	Leu	Cys	Glu	Cys	Tyr	485	490	495	
Asp	Ala	Gly	Cys	Ala	Trp	Tyr	Glu	Leu	Thr	Pro	Ala	Glu	Thr	Thr	Val	500	505	510	
Arg	Leu	Arg	Ala	Tyr	Met	Asn	Thr	Pro	Gly	Leu	Pro	Val	Cys	Gln	Asp	515	520	525	
His	Leu	Glu	Phe	Trp	Glu	Gly	Val	Phe	Thr	Gly	Leu	Thr	His	Ile	Asp	530	535	540	
Ala	His	Phe	Leu	Ser	Gln	Thr	Lys	Gln	Ser	Gly	Glu	Asn	Leu	Pro	Tyr	545	550	555	560
Leu	Val	Ala	Tyr	Gln	Ala	Thr	Val	Cys	Ala	Arg	Ala	Gln	Ala	Pro	Pro	565	570	575	
Pro	Ser	Trp	Asp	Gln	Met	Trp	Lys	Cys	Leu	Ile	Arg	Leu	Lys	Pro	Thr	580	585	590	
Leu	His	Gly	Pro	Thr	Pro	Leu	Leu	Tyr	Arg	Leu	Gly	Ala	Val	Gln	Asn	595	600	605	
Glu	Val	Thr	Leu	Thr	His	Pro	Val	Thr	Lys	Tyr	Ile	Met	Thr	Cys	Met	610	615	620	
Ser	Ala	Asp	Leu	Glu	Val	Val	Cys	Ser	Thr	Trp	Val	Leu	Val	Gly	Gly	625	630	635	640
Val	Leu	Ala	Ala	Leu	Ala	Ala	Tyr	Cys	Leu	Ser	Thr	Gly	Cys	Val	Val	645	650	655	
Ile	Val	Gly	Arg	Ile	Val	Leu	Ser	Gly	Lys	Pro	Ala	Ile	Ile	Pro	Asp	660	665	670	
Arg	Glu	Val	Leu	Tyr	Arg	Glu	Phe	Asp	Glu	Met	Glu	Glu	Cys			675	680	685	

<210> 47

<211> 686

<212> PRT

<213> Artificial Sequence

<220>

<223> Mutant Hepatitis C virus NS3/4A

<400> 47

Met Ala Pro Ile Thr Ala Tyr Ala Gln Gln Thr Arg Gly Leu Leu Gly  
1 5 10 15  
Cys Ile Ile Thr Ser Leu Thr Gly Arg Asp Lys Asn Gln Val Glu Gly  
20 25 30  
Glu Val Gln Ile Val Ser Thr Ala Ala Gln Thr Phe Leu Ala Thr Cys  
35 40 45  
Ile Asn Gly Val Cys Trp Thr Val Tyr His Gly Ala Gly Thr Arg Thr  
50 55 60  
Ile Ala Ser Pro Lys Gly Pro Val Ile Gln Met Tyr Thr Asn Val Asp  
65 70 75 80  
Gln Asp Leu Val Gly Trp Pro Ala Pro Gln Gly Ala Arg Ser Leu Thr  
85 90 95  
Pro Cys Thr Cys Gly Ser Ser Asp Leu Tyr Leu Val Thr Arg His Ala  
100 105 110  
Asp Val Ile Pro Val Arg Arg Arg Gly Asp Gly Arg Gly Ser Leu Leu  
115 120 125  
Ser Pro Arg Pro Ile Ser Tyr Leu Lys Gly Ser Ser Gly Gly Pro Leu  
130 135 140  
Leu Cys Pro Ala Gly His Ala Val Gly Ile Phe Arg Ala Ala Val Cys  
145 150 155 160  
Thr Arg Gly Val Ala Lys Ala Val Asp Phe Ile Pro Val Glu Ser Leu  
165 170 175  
Glu Thr Thr Met Arg Ser Pro Val Phe Ser Asp Asn Ser Ser Pro Pro  
180 185 190  
Ala Val Pro Gln Ser Tyr Gln Val Ala His Leu His Ala Pro Thr Gly  
195 200 205  
Ser Gly Lys Ser Thr Lys Val Pro Ala Ala Tyr Ala Ala Gln Gly Tyr  
210 215 220  
Lys Val Leu Val Leu Asn Pro Ser Val Ala Ala Thr Met Gly Phe Gly  
225 230 235 240  
Ala Tyr Met Ser Lys Ala His Gly Ile Asp Pro Asn Ile Arg Thr Gly  
245 250 255  
Val Arg Thr Ile Thr Thr Gly Ser Pro Ile Thr Tyr Ser Thr Tyr Gly  
260 265 270  
Lys Phe Leu Ala Asp Gly Gly Cys Ser Gly Gly Ala Tyr Asp Ile Ile  
275 280 285  
Ile Cys Asp Glu Cys His Ser Thr Asp Ala Thr Ser Ile Leu Gly Ile  
290 295 300  
Gly Thr Val Leu Asp Gln Ala Glu Thr Ala Gly Ala Arg Leu Thr Val  
305 310 315 320  
Leu Ala Thr Ala Thr Pro Pro Gly Ser Val Thr Val Pro His Pro Asn  
325 330 335  
Ile Glu Glu Val Ala Leu Ser Thr Thr Gly Glu Ile Pro Phe Tyr Gly  
340 345 350  
Lys Ala Ile Pro Leu Glu Ala Ile Lys Gly Gly Arg His Leu Ile Phe  
355 360 365  
Cys His Ser Lys Lys Lys Cys Asp Glu Leu Ala Ala Lys Leu Val Ala  
370 375 380  
Leu Gly Val Asn Ala Val Ala Tyr Tyr Arg Gly Leu Asp Val Ser Val  
385 390 395 400  
Ile Pro Thr Ser Gly Asp Val Val Val Val Ala Thr Asp Ala Leu Met





Arg Leu Arg Ala Tyr Met Asn Thr Pro Gly Leu Pro Val Cys Gln Asp  
 515 520 525  
 His Leu Glu Phe Trp Glu Gly Val Phe Thr Gly Leu Thr His Ile Asp  
 530 535 540  
 Ala His Phe Leu Ser Gln Thr Lys Gln Ser Gly Glu Asn Leu Pro Tyr  
 545 550 555 560  
 Leu Val Ala Tyr Gln Ala Thr Val Cys Ala Arg Ala Gln Ala Pro Pro  
 565 570 575  
 Pro Ser Trp Asp Gln Met Trp Lys Cys Leu Ile Arg Leu Lys Pro Thr  
 580 585 590  
 Leu His Gly Pro Thr Pro Leu Leu Tyr Arg Leu Gly Ala Val Gln Asn  
 595 600 605  
 Glu Val Thr Leu Thr His Pro Val Thr Lys Tyr Ile Met Thr Cys Met  
 610 615 620  
 Ser Ala Asp Leu Glu Val Ser Ser Ser Thr Trp Val Leu Val Gly Gly  
 625 630 635 640  
 Val Leu Ala Ala Leu Ala Ala Tyr Cys Leu Ser Thr Gly Cys Val Val  
 645 650 655  
 Ile Val Gly Arg Ile Val Leu Ser Gly Lys Pro Ala Ile Ile Pro Asp  
 660 665 670  
 Arg Glu Val Leu Tyr Arg Glu Phe Asp Glu Met Glu Glu Cys  
 675 680 685

<210> 49

<211> 686

<212> PRT

<213> Artificial Sequence

<220>

<223> Mutant Hepatitis C virus NS3/4A

<400> 49

Met Ala Pro Ile Thr Ala Tyr Ala Gln Gln Thr Arg Gly Leu Leu Gly  
 1 5 10 15  
 Cys Ile Ile Thr Ser Leu Thr Gly Arg Asp Lys Asn Gln Val Glu Gly  
 20 25 30  
 Glu Val Gln Ile Val Ser Thr Ala Ala Gln Thr Phe Leu Ala Thr Cys  
 35 40 45  
 Ile Asn Gly Val Cys Trp Thr Val Tyr His Gly Ala Gly Thr Arg Thr  
 50 55 60  
 Ile Ala Ser Pro Lys Gly Pro Val Ile Gln Met Tyr Thr Asn Val Asp  
 65 70 75 80  
 Gln Asp Leu Val Gly Trp Pro Ala Pro Gln Gly Ala Arg Ser Leu Thr  
 85 90 95  
 Pro Cys Thr Cys Gly Ser Ser Asp Leu Tyr Leu Val Thr Arg His Ala  
 100 105 110  
 Asp Val Ile Pro Val Arg Arg Arg Gly Asp Gly Arg Gly Ser Leu Leu  
 115 120 125  
 Ser Pro Arg Pro Ile Ser Tyr Leu Lys Gly Ser Ser Gly Gly Pro Leu  
 130 135 140  
 Leu Cys Pro Ala Gly His Ala Val Gly Ile Phe Arg Ala Ala Val Cys  
 145 150 155 160  
 Thr Arg Gly Val Ala Lys Ala Val Asp Phe Ile Pro Val Glu Ser Leu  
 165 170 175

Glu	Thr	Thr	Met	Arg	Ser	Pro	Val	Phe	Ser	Asp	Asn	Ser	Ser	Pro	Pro		
			180					185					190				
Ala	Val	Pro	Gln	Ser	Tyr	Gln	Val	Ala	His	Leu	His	Ala	Pro	Thr	Gly		
		195					200					205					
Ser	Gly	Lys	Ser	Thr	Lys	Val	Pro	Ala	Ala	Tyr	Ala	Ala	Gln	Gly	Tyr		
	210					215					220						
Lys	Val	Leu	Val	Leu	Asn	Pro	Ser	Val	Ala	Ala	Thr	Met	Gly	Phe	Gly		
225					230					235					240		
Ala	Tyr	Met	Ser	Lys	Ala	His	Gly	Ile	Asp	Pro	Asn	Ile	Arg	Thr	Gly		
			245						250					255			
Val	Arg	Thr	Ile	Thr	Thr	Gly	Ser	Pro	Ile	Thr	Tyr	Ser	Thr	Tyr	Gly		
			260					265					270				
Lys	Phe	Leu	Ala	Asp	Gly	Gly	Cys	Ser	Gly	Gly	Ala	Tyr	Asp	Ile	Ile		
	275						280					285					
Ile	Cys	Asp	Glu	Cys	His	Ser	Thr	Asp	Ala	Thr	Ser	Ile	Leu	Gly	Ile		
	290					295					300						
Gly	Thr	Val	Leu	Asp	Gln	Ala	Glu	Thr	Ala	Gly	Ala	Arg	Leu	Thr	Val		
305					310					315					320		
Leu	Ala	Thr	Ala	Thr	Pro	Pro	Gly	Ser	Val	Thr	Val	Pro	His	Pro	Asn		
				325					330					335			
Ile	Glu	Glu	Val	Ala	Leu	Ser	Thr	Thr	Gly	Glu	Ile	Pro	Phe	Tyr	Gly		
			340					345					350				
Lys	Ala	Ile	Pro	Leu	Glu	Ala	Ile	Lys	Gly	Gly	Arg	His	Leu	Ile	Phe		
	355						360					365					
Cys	His	Ser	Lys	Lys	Lys	Cys	Asp	Glu	Leu	Ala	Ala	Lys	Leu	Val	Ala		
	370					375					380						
Leu	Gly	Val	Asn	Ala	Val	Ala	Tyr	Tyr	Arg	Gly	Leu	Asp	Val	Ser	Val		
385					390					395					400		
Ile	Pro	Thr	Ser	Gly	Asp	Val	Val	Val	Val	Ala	Thr	Asp	Ala	Leu	Met		
			405					410						415			
Thr	Gly	Phe	Thr	Gly	Asp	Phe	Asp	Ser	Val	Ile	Asp	Cys	Asn	Thr	Cys		
			420				425						430				
Val	Thr	Gln	Thr	Val	Asp	Phe	Ser	Leu	Asp	Pro	Thr	Phe	Thr	Ile	Glu		
	435						440					445					
Thr	Ile	Thr	Leu	Pro	Gln	Asp	Ala	Val	Ser	Arg	Thr	Gln	Arg	Arg	Gly		
	450					455					460						
Arg	Thr	Gly	Arg	Gly	Lys	Pro	Gly	Ile	Tyr	Arg	Phe	Val	Ala	Pro	Gly		
465					470					475					480		
Glu	Arg	Pro	Ser	Gly	Met	Phe	Asp	Ser	Ser	Val	Leu	Cys	Glu	Cys	Tyr		
				485					490					495			
Asp	Ala	Gly	Cys	Ala	Trp	Tyr	Glu	Leu	Thr	Pro	Ala	Glu	Thr	Thr	Val		
			500					505					510				
Arg	Leu	Arg	Ala	Tyr	Met	Asn	Thr	Pro	Gly	Leu	Pro	Val	Cys	Gln	Asp		
	515						520					525					
His	Leu	Glu	Phe	Trp	Glu	Gly	Val	Phe	Thr	Gly	Leu	Thr	His	Ile	Asp		
	530					535					540						
Ala	His	Phe	Leu	Ser	Gln	Thr	Lys	Gln	Ser	Gly	Glu	Asn	Leu	Pro	Tyr		
545					550					555					560		
Leu	Val	Ala	Tyr	Gln	Ala	Thr	Val	Cys	Ala	Arg	Ala	Gln	Ala	Pro	Pro		
				565					570					575			
Pro	Ser	Trp	Asp	Gln	Met	Trp	Lys	Cys	Leu	Ile	Arg	Leu	Lys	Pro	Thr		
			580					585					590				
Leu	His	Gly	Pro	Thr	Pro	Leu	Leu	Tyr	Arg	Leu	Gly	Ala	Val	Gln	Asn		
	595					600					605						
Glu	Val	Thr	Leu	Thr	His	Pro	Val	Thr	Lys	Tyr	Ile	Met	Thr	Cys	Met		

[illegible]